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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,422	09/26/2006	Akira Kitano	160-513	3248

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EXAMINER	
CARTER, MICHAEL W	

ART UNIT	PAPER NUMBER
2828	

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12/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,422	KITANO ET AL.	
	Examiner	Art Unit	
	Michael Carter	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/26/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on applications filed in Japan on 3/26/2004 and 3/2/2005. It is noted, however, that applicant has not filed a certified copy of the 2004-092656 and 2005-057761 applications as required by 35 U.S.C. 119(b).

Specification

2. **Claims 2 and 10** are objected to because of the following informalities: The limitation in line 3 of both claims state "staked." It appears to be a typo which should be "stacked" as in claim 1. For purposes of the art rejection below, it is assumed to be "stacked." Appropriate correction is required.

3. **Claim 8** is objected to because of the following informalities: The limitation in lines 5-6 state "the insulation region for reducing the capacitance of the element includes at least the first electrode or". Since the electrode is a conducting element it is unclear how it belongs to an insulation region. An art rejection is made below based on the limitation following the "or" in line 6 of claim 8. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claim 10** is rejected under 35 U.S.C. 102(b) as being anticipated by Kubota et al. US Patent 6,661,822 (hereinafter referred to as Kubota).

6. **For claim 10**, Kubota teaches a nitride semiconductor laser element characterized by comprising: a semiconductor layer of a first conductivity type, an active layer and a semiconductor layer of a second conductivity type, which are staked one upon the other and each comprises a nitride; a striped waveguide region of a laser light provided on the semiconductor layer of the second conductivity type; and an insulative region at a region other than the waveguide region in the semiconductor of the second conductivity type (figure 2 and column 4, lines 57-67). While Kubota does not teach the region has a withstand voltage of 10V or more, it is taught that the region (AlN) is up to 300nm thick (column 5, lines 36-38) which, according to the applicant, inherently provides a structure with a withstand voltage of 10 V or more (instant application, paragraph 136).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. **Claims 1-4, 6-9, and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawagoe, US PG Pub 2004/0124500 (hereinafter referred to as

Kawagoe) in view of Norihiro et al. JP Patent 5-190980 (hereinafter referred to as Norihiro).

9. **For claims 1-3**, Kawagoe teaches, a nitride semiconductor laser element characterized by comprising: a semiconductor layer of a first conductivity type (figure 1, labels 103-106), an active layer (figure 1, label 107) and a semiconductor layer of a second conductivity type (figure 1, labels 188-111), which are stacked one upon the other and each comprises a nitride (paragraph 28); a striped waveguide region for a laser light provided on the semiconductor layer of the second conductivity type (figure 1, label 111).

Kawage does not teach an insulative region, formed by implanting ions, for reducing the capacitance of the element, wherein a pn-junction of the semiconductor layer at a peripheral region remote from the waveguide region is broken.

However, Norihiro teaches an insulative region, formed by implanting ions, for reducing the capacitance of the element, wherein a pn-junction of the semiconductor layer at a peripheral region remote from the waveguide region is broken in order to increase the speed of a laser (figure 1 and paragraphs 5-6).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to combine the insulating region taught by Norihiro with Kawagoe's laser in order to increase the speed of the laser.

10. **For claim 4,** Kawagoe and Norihiro are applied as to claims 1-3. Further, Kawagoe teaches a substrate (figure 1, label 101), an embedded insulation film covering a side face of the waveguide region and a surface of the semiconductor layer

of the second conductivity type (figure 1, label 162), a first electrode in contact with a surface of the waveguide region (figure 1, label 120), a protective insulation film covering at least a part of the embedded insulation film (figure 1, label 164), a second electrode substantially connected to the semiconductor layer of the first conductivity type (figure 1, label 121).

11. **For claim 6,** the combination does not teach the insulative region for reducing the capacitance of the element has a peak of distribution of the impurity concentration in the depth direction in the range from 200 nm to 1 μm from the surface of the semiconductor layer of the second conductivity type.

However, it has been held that discovering a workable range involves only routine skill in the art. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to discover the workable range for the depth of implantation in order to form the insulative region as discussed for claim 1.

12. **For claim 7**, the combination teaches the first electrode is formed in contact with the surface of the waveguide region so as to cover a part of the embedded insulation film (figure 1), a pad electrode is formed in contact with the first electrode so as to cover a part of the protective insulation film (figure 1, label 122), and the insulative region for reducing the capacitance of the element includes a region below the embedded insulation film (figure1 of both Kawage and Norihiro).

13. **For claim 8,** the combination is applied as to claim 7. Further, the combination teaches the insulation region for reducing the capacitance of the element includes at

least the first electrode or a region below the pad electrode (figure1 of both Kawage and Norihiro).

14. **For claims 9 and 14,** Kawagoe teaches the semiconductor laser element is a laser element for emitting bluish-purple light (paragraphs 2 and 5).

The combination does not teach the responsiveness of the laser to input of pulse drive current. However, as discussed for claim 1, the combination does teach speeding up a laser. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to set the responsiveness according to the speed required by an application using the laser, and no special significance is given to a response time of 1 ns.

15. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawagoe, in view of Norihiro, and further in view of Komori et al. US PG Pub 2001/0006529 (hereinafter referred to as Komori).

16. **For claim 5,** Kawagoe and Norihiro remain applied as to claim 1.

The combination does not teach the insulative region for reducing the capacitance of the element has an impurity peak concentration in the range from $1*10^{18}$ to $5*10^{21}$ atms/cm^3.

However, Komori does teach using a concentration $3*10^{18}$ atms/cm^3 in order to create a current blocking layer (paragraph 41).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to determine the workable range, including $3*10^{18}$ atms/cm^3, for impurity concentration in order create a current blocking layer, as discussed for claim 1,

since it has been held that discovering a workable range only involves routine skill in the art.

17. **Claims 11-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawagoe, in view of Nagashima et al. US Patent 6,697,407 (hereinafter referred to as Nagashima).

18. **For claim 11**, Kawagoe teaches a nitride semiconductor laser element characterized by comprising: a semiconductor layer of a first conductivity type (figure 1, labels 103-106), an active layer (figure 1, label 107) and a semiconductor layer of a second conductivity type being different from the first conductivity type (figure 1, labels 188-111), which are stacked on a main surface of a substrate and each comprises a nitride (paragraph 28); and a striped waveguide region for a laser light provided on the semiconductor layer of the second conductivity type (figure 1, label 111).

Kawagoe does not teach wherein at least a part of the semiconductor layer of the second conductivity type serves as a region for reducing the capacitance of the element by being converted into the first conductivity type in a direction of thickness at a peripheral region remote from the waveguide region.

However, Nagashima does teach at least a part of the semiconductor layer of the second conductivity type serves as a region for reducing the capacitance of the element by being converted into the first conductivity type in a direction of thickness at a peripheral region remote from the waveguide region (figure 1, label 30) in order to form a current blocking layer (column 10, lines 33-38).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to convert part of the second type layer in Kawagoe into a first type layer according to Nagashima in order to form a current blocking layer.

19. **For claim 12**, Nagashima further teaches an npn structure (figure 1, labels 21, 29, and 30) in the peripheral region remote from the waveguide region, wherein the semiconductor layer of the first conductivity type is an n-type semiconductor layer, and the semiconductor layer of the second conductivity type is a p-type semiconductor layer.

20. **For claim 13**, Nagashima further teaches a pnpn structure (figure 1, labels 21, 29, 30, and 31) in the peripheral region remote from the waveguide region, wherein the semiconductor layer of the first conductivity type is an n-type semiconductor layer, and the semiconductor layer of the second conductivity type is a p-type semiconductor layer.

Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Carter whose telephone number is (571) 270-1872. The examiner can normally be reached on Monday-Friday, 7:00 a.m.-4:30 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status

information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MC

MINSUN OH HARVEY
PRIMARY EXAMINER

Sheet 1 of 1

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IAP01 Rec'd PCT/PTO 26 SEP 2006

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INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

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160-513	10/594,422
APPLICANT	
KITANO et al	
FILING DATE	**TC/A.U.**
September 26, 2006	2828

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE

FOREIGN PATENT DOCUMENTS

		DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
/M.C./		2001-210914	08/2001	JP			PARTIAL	
/M.C./		2003-31909	01/2003	JP			PARTIAL	
/M.C./		5-190980 A	07/1993	JP				
/M.C./		2002-237661 A	08/2002	JP				
/M.C./		2003-264346 A	09/2003	JP				
/M.C./		63-222488 A	09/1988	JP				

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent pages, etc.)

/M.C./		International Search Report for PCT/JP2005/004249 mailed 26 April 2005

*Examiner	/Michael Carter/	Date Considered	12/19/2007

Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application.